

these two more or less general cold waves and also for limited areas on the 8th, 13th, 24th, and 25th.

Warnings for frost and freezing temperature were issued for portions of the east Gulf and South Atlantic States on 12 days during the month. While these warnings included extreme northern Florida eight times, the only forecast of frost for central Florida was that of the 1st. Bartow reported light frost on the morning of the 2d, the only frost during the month in that section. The atmospheric pressure remained relatively high over the Florida Peninsula and over the ocean to the eastward throughout the period of advance of the two widespread cold waves from the Northwest. Consequently, no damaging temperature was experienced in the Florida Peninsula.—*C. L. Mitchell.*

CHICAGO FORECAST DISTRICT

The monthly mean temperature was far below the seasonal normal over practically the entire forecast district. The greatest departures were -12.3° at Duluth, Minn., and -11.6° at Havre, Mont., and the smallest departure was -2.6° at Cairo, Ill.

The precipitation was below the monthly normal over the Upper Lake region, but in nearly all other sections it was above, and markedly so in the lower Ohio and lower Missouri Valleys.

Cold-wave warnings.—Although the average monthly temperature was very low, the weather was, nevertheless, fairly mild during the first half, and the cold waves during that period were local and fleeting. It was not until the night of the 14th that the front of the first cold wave, which had moved southeastward from Alaska, reached Alberta. This steadily increased in energy, with not only falling temperature but increasing atmospheric pressure. The full force of the cold wave was not felt to the eastern limits of the district until the 19th and 20th. The pressure exceeded the December record at several stations in the district, and the cold was more severe than any previously experienced in December for many years. Warnings were issued well in advance of the fall in temperature, and all interests throughout the district notified.

The cold continued in most sections until near the close of the month, aside from temporary relief on two or three days. There was marked redevelopment in the Northwest on the 26th, and in consequence, additional cold-wave warnings were necessary for the eastern portion of the forecast district.

Livestock warnings.—Warnings were issued on the 14th of the month to livestock interests in Montana, the Dakotas, Wyoming, and Nebraska. Additional messages were sent to the southern portion of this area on December 15 and 16, and on the 17th the warnings were extended into Kansas, so that the cattle interests had advice well in advance of the great cold wave and strong northerly winds which accompanied it.

Storm warnings.—Storm warnings were issued for the Great Lakes during the month from time to time, when occasion demanded, until the close of regular navigation on the 16th. The principal storm occurred on the 13th, due to the rapid deepening of a depression in Ontario and the development of a high in Manitoba. On the morning of the 12th a forecast for "fresh to strong winds with rain or snow" was made for the Upper Lakes and "fresh winds" for the Lower Lakes, and in the evening northwest storm warnings were ordered on Lake Superior, it being thought that warnings might be issued on the morning of the 13th sufficiently early for the rest of the region. However, by daybreak the storm was

being felt in full force over Lake Michigan, and later in the day over Lake Huron and the Lower Lakes. Storm warnings were then, of course, flying at all Lake stations, although, obviously, too late to be of any service on Lakes Michigan and Huron. However, because of the lateness of the season, most of the vessels had made their last trip and had reached winter quarters: and, fortunately, so far as known, no losses were sustained.

Special attention was given to the shippers of perishable goods in all directions during the extreme winter conditions, as a part of the regular advisory service maintained for the benefit of fruit shippers in the north Pacific States. Messages were sent to three exchanges every Monday morning, covering, as far as practicable, the temperature conditions for the ensuing week for the northwestern portion of the Chicago district. These advices had, for the most part, a high degree of verification, and it is believed that no loss whatever was sustained by these shippers.—*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT

After the first week, areas of high pressure were dominant and in some instances were attended by severe cold.

Cold-wave warnings were issued during the afternoon of the 3d for the northwestern portion of the district except the northern portion of West Texas. Temperatures below freezing occurred on the morning of the 5th but were not low enough to verify the cold-wave warnings. In this instance the principal crest of the area of high pressure moved eastward, and the western extension following the Low diminished in intensity.

A cold-wave warning was issued for parts of central and southwestern Texas on the ninth, after the receipt of special observations, but failed of verification, conditions proving to be less intense than was expected, with cloudy weather ensuing.

Warnings were issued well in advance of a slow moving but severe cold wave which reached the northwestern portion of the district on the 17th and extended to the Texas coast on the 19th and to the Louisiana coast on the 20th. The area of high pressure in this instance was unusually large and was preceded by a well-defined area of low pressure which moved slowly southward over the Rocky Mountain region and the Southwestern States. The cold wave was attended by considerable snow and sleet, with glaze in some localities. Stockmen received early advices of the severe conditions. Temperatures of 24° to 30° were predicted on two successive days for the lower Rio Grande Valley and temperatures occurred as forecast, with a minimum of 26° at Brownsville, Tex.

While temperatures were still low in most sections of the district a large northwestern HIGH and a southwestern LOW attained marked development on the 23d and a cold wave occurred as the high moved southward, reaching the Texas coast Christmas eve and extending to the southeastern coast of Louisiana during the night of the 24th-25th. Timely cold-wave and temperature warnings and warnings for stockmen were issued.

Cold-wave and livestock warnings were issued for the district, except the southwestern portion of West Texas, in timely advance of a large area of high pressure, which moved southeastward from Alberta on the 26th-27th; but after reaching the lower Missouri Valley, the crest of the area of high pressure moved eastward. Freezing temperatures did not reach the coast, but there was a cold wave as forecast for the interior sections of the district, with temperatures below zero in central Oklahoma and zero to 14° above in Arkansas.